

# Indications and Route of Hysterectomy for Benign Diseases. Guideline of the DGGG, OEGGG and SGGG (S3 Level, AWMF Registry No. 015/070, April 2015)

Indikation und Methodik der Hysterektomie bei benignen Erkrankungen.  
Leitlinie der DGGG, OEGGG und SGGG (S3-Level, AWMF-Registernummer 015/070, April 2015)

## Authors

K. J. Neis<sup>1</sup>, W. Zubke<sup>2</sup>, T. Römer<sup>3</sup>, K. Schwerdtfeger<sup>4</sup>, T. Schollmeyer<sup>†5</sup>, S. Rimbach<sup>6</sup>, B. Holthaus<sup>7</sup>, E. Solomayer<sup>1</sup>, B. Bojahr<sup>8</sup>, F. Neis<sup>9</sup>, C. Reisenauer<sup>9</sup>, B. Gabriel<sup>10</sup>, H. Dieterich<sup>11</sup>, I. B. Runnenbaum<sup>12</sup>, W. Kleine<sup>13</sup>, A. Strauss<sup>14</sup>, M. Menton<sup>15</sup>, I. Mylonas<sup>16</sup>, M. David<sup>17</sup>, L.-C. Horn<sup>18</sup>, D. Schmidt<sup>19</sup>, P. Gaß<sup>20</sup>, A. T. Teichmann<sup>21</sup>, P. Brandner<sup>22</sup>, W. Stummvoll<sup>†23</sup>, A. Kuhn<sup>24</sup>, M. Müller<sup>24</sup>, M. Fehr<sup>25</sup>, K. Tamussino<sup>26</sup>

## Affiliations

The affiliations are listed at the end of the article.

## Key words

- guideline
- hysterectomy
- uterine myomas
- bleeding disorders
- endometriosis

## Schlüsselwörter

- Leitlinie
- Hysterektomie
- Uterus myomatosus
- Blutungsstörungen
- Endometriose



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## Correspondence

**Prof. Dr. Klaus Neis**  
Department of Gynecology,  
Obstetrics and Reproductive  
Medicine of the University  
Hospital of the Saarland,  
Homburg/Saar  
Frauenärzte am Staden  
Bismarckstraße 39–41  
66121 Saarbrücken  
kjneis@gyn-saar.de

## Abstract

**Background:** Official guideline “indications and methods of hysterectomy” to assign indications for the different methods published and coordinated by the German Society of Gynecology and Obstetrics (DGGG), the Austrian Society of Gynecology and Obstetrics (OEGGG) and the Swiss Society of Gynecology and Obstetrics (SGGG). Besides vaginal and abdominal hysterectomy, three additional techniques have been implemented due to the introduction of laparoscopy. Organ-sparing alternatives were also integrated.

**Methods:** The guideline group consisted of 26 experts from Germany, Austria and Switzerland. Recommendations were developed using a structured consensus process and independent moderation. A systematic literature search and quality appraisal of benefits and harms of the therapeutic alternatives for symptomatic fibroids, dysfunctional bleeding and adenomyosis was done through MEDLINE up to 6/2014 focusing on systematic reviews and meta-analysis.

**Results:** All types of hysterectomy led in studies to high rates of patient satisfaction. If possible, vaginal instead of abdominal hysterectomy should preferably be done. If a vaginal hysterectomy is not feasible, the possibility of a laparoscopic hysterectomy should be considered. An abdominal hysterectomy should only be done with a special indication. Organ-sparing interventions also led to high patient satisfaction rates, but contain the risk of symptom recurrence.

**Conclusion:** As an aim, patients should be enabled to choose that therapeutic intervention for their benign disease of the uterus that convenes best to them and their personal life situation.

## Zusammenfassung

**Hintergrund:** Offizielle Leitlinie, publiziert und koordiniert von der Deutschen Gesellschaft für Gynäkologie und Geburtshilfe (DGGG), der Österreichischen Gesellschaft für Gynäkologie und Geburtshilfe (OEGGG) und der Schweizerischen Gesellschaft für Gynäkologie und Geburtshilfe (SGGG). Durch die Einführung laparoskopischer Operationen wurde die vaginale und abdominale Hysterektomie um 3 weitere Techniken ergänzt. Um die Indikationsfelder abzugrenzen, wurde die Leitlinie „Indikation und Methodik der Hysterektomie bei benignen Erkrankungen“ initiiert. Organerhaltende Therapiealternativen wurden ebenfalls integriert.

**Methode:** Die Leitlinie wurde durch ein repräsentatives Gremium von 26 Experten aus Deutschland, Österreich und der Schweiz unter strukturierter unabhängiger Moderation im Konsens erstellt. Die systematische Literatursuche und -bewertung zu Nutzen und Schaden der Therapiealternativen bei symptomatischem Uterus myomatosus, funktionellen Blutungsstörungen und Adenomyosis sowie ein Vergleich der Hysterektomieverfahren erfolgte bis 06/2014 in der Datenbank MEDLINE mit Fokus auf aggregierter Evidenz.

**Ergebnisse:** Alle Formen der Hysterektomie sind in Studien mit einer hohen Zufriedenheit der Patientinnen verbunden. Der vaginalen Hysterektomie soll gegenüber der abdominalen, wenn möglich, der Vorzug gegeben werden. Ist die vaginale Hysterektomie nicht möglich, sollte die Möglichkeit einer laparoskopischen Hysterektomie geprüft werden. Die abdominale Hysterektomie sollte nur bei gesonderter Indikation durchgeführt werden. Für die organerhaltenden Alternativen wurde ebenfalls ein hoher Zufriedenheitsgrad festgestellt, allerdings können bei Belassen des Uterus Rezidive auftreten.

**Schlussfolgerung:** Ziel der Aufklärung ist, die Patientin in die Lage zu versetzen, unter den Therapieoptionen für benigne Uteruserkrankungen diejenige herauszufinden, die am besten zu ihr und ihrer Lebenssituation passt.

## I Guideline Information

Guidelines Program of the DGGG, OEGGG and SGGG. Information on this topic is provided at the end of the guideline.

### Citation format

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## Guideline documents

The complete long version and a summary of the conflicts of interest of all of the authors in the Guideline methods report are available on the AWMF website:  
<http://www.awmf.org/leitlinien/detail/ll/015-070.html>

## Authors

See **Table 1**.

**Table 1** Authors.

Author Mandate holder	DGGG working group/professional association/organization/society
<b>Coordinating lead authors:</b>	
Prof. Dr. med. K. J. Neis <sup>1,3</sup>	German Society of Gynecology and Obstetrics (Deutsche Gesellschaft für Gynäkologie und Geburtshilfe [DGGG])
Prof. Dr. med. K. Schwerdtfeger <sup>1</sup>	AWMF Guideline consultant
<b>Other participating authors contributing to the guideline:</b>	
Dr. med. W. Zubke <sup>2,3</sup>	German Society of Gynecology and Obstetrics (Deutsche Gesellschaft für Gynäkologie und Geburtshilfe [DGGG])
Prof. Dr. med. K. Tamussino <sup>2,3</sup>	Austrian Society of Gynecology and Obstetrics (Österreichische Gesellschaft für Gynäkologie und Geburtshilfe [OEGGG])
Prim. Dr. med. W. Stummvoll <sup>†</sup>	Austrian Society of Gynecology and Obstetrics (Österreichische Gesellschaft für Gynäkologie und Geburtshilfe [OEGGG])
PD Dr. med. M. Fehr <sup>2</sup>	Swiss Society of Gynecology and Obstetrics (Schweizerische Gesellschaft für Gynäkologie und Geburtshilfe [SGGG])
Prof. Dr. med. A. Kuhn <sup>3</sup>	Swiss Society of Gynecology and Obstetrics (Schweizerische Gesellschaft für Gynäkologie und Geburtshilfe [SGGG])
Prof. Dr. med. M. Müller	Swiss Society of Gynecology and Obstetrics (Schweizerische Gesellschaft für Gynäkologie und Geburtshilfe [SGGG])
Prof. Dr. med. B. Bojahr	Working Group for Gynecological Endoscopy (Arbeitsgemeinschaft Gynäkologische Endoskopie [AGE])
PD Dr. med. S. Rimbach	Working Group for Gynecological Endoscopy (Arbeitsgemeinschaft Gynäkologische Endoskopie [AGE])
Prof. Dr. med. T. Römer <sup>2,3</sup>	Working Group for Gynecological Endoscopy (Arbeitsgemeinschaft Gynäkologische Endoskopie [AGE])
Prof. Dr. med. E. Solomayer <sup>3</sup>	Working Group for Gynecological Endoscopy (Arbeitsgemeinschaft Gynäkologische Endoskopie [AGE])
Dr. med. T. Schollmeyer <sup>†</sup>	Working Group for Gynecological Endoscopy (Arbeitsgemeinschaft Gynäkologische Endoskopie [AGE])
Dr. med. B. Holthaus	Working Group for Gynecological Endoscopy (Arbeitsgemeinschaft Gynäkologische Endoskopie [AGE])
Dr. med. F. Neis <sup>3</sup>	Working Group for Gynecological Endoscopy (Arbeitsgemeinschaft Gynäkologische Endoskopie [AGE])
Prof. Dr. med. B. Gabriel	Working Group for Urogynecology and Reconstructive Pelvic Surgery (Arbeitsgemeinschaft für Urogynäkologie und plastische Beckenbodenrekonstruktion [AGUB])
Prof. Dr. med. C. Reisenauer <sup>3</sup>	Working Group for Urogynecology and Reconstructive Pelvic Surgery (Arbeitsgemeinschaft für Urogynäkologie und plastische Beckenbodenrekonstruktion [AGUB])
Dr. med. H. Dieterich	Working Group for Esthetic, Plastic and Reconstructive Surgery in Gynecology (Arbeitsgemeinschaft für ästhetische, plastische und wiederherstellende Operationsverfahren in der Gynäkologie [AWOGyn])
Prof. Dr. med. I. B. Runnenbaum <sup>3</sup>	Working Group Gynecologic Oncology (Arbeitsgemeinschaft Gynäkologische Onkologie [AGO])
Prof. Dr. med. W. Kleine	Working Group Gynecologic Oncology (Arbeitsgemeinschaft Gynäkologische Onkologie [AGO])
Prof. Dr. med. A. Strauss <sup>3</sup>	Working Group for Ultrasound Diagnosis in Gynecology and Obstetrics (Arbeitsgemeinschaft für Ultraschalldiagnostik in Gynäkologie und Geburtshilfe [ARGUS])
Prof. Dr. med. M. Menton <sup>3</sup>	Committee on Cervical Pathology and Colposcopy (Arbeitsgemeinschaft Zervixpathologie & Kolposkopie [AGCPC])
Prof. Dr. med. I. Mylonas <sup>3</sup>	Working Group for Infectious Diseases and Infection Immunology (Arbeitsgemeinschaft Infektiologie und Infektionsimmunologie ([AGII])
Prof. Dr. M. David <sup>3</sup>	German Society for Psychosomatic Gynecology and Obstetrics (Deutsche Gesellschaft für Psychosomatische Frauenheilkunde und Geburtshilfe [DGPF])
Prof. Dr. med. L-C. Horn	German Society of Pathology (Deutsche Gesellschaft für Pathologie [DGP]) Federal Association of Pathologists (Berufsverband Deutsche Pathologen [BDP])
Prof. Dr. med. D. Schmidt	German Society of Pathology (Deutsche Gesellschaft für Pathologie [DGP]) Federal Association of Pathologists (Berufsverband Deutsche Pathologen [BDP])
Prof. Dr. med. A. T. Teichmann	Association of Head Physicians of Gynecological and Obstetric Hospitals (Bundesarbeitsgemeinschaft Leitender Ärztinnen und Ärzte in der Frauenheilkunde und Geburtshilfe [BLFG])
Dr. med. P. Brandner <sup>3</sup>	Federal Association of Gynecologists (Bundesverband der Frauenärzte e. V. [BVF])
Dr. M. Nothacker <sup>4</sup>	AWMF Guideline consultant

<sup>1</sup> methodological support, drafting of the guideline report, <sup>2</sup> member of the steering committee, <sup>3</sup> participant in the nominal group process entitled to vote,

<sup>4</sup> drafting of the evidence report

## Abbreviations

AGCPC	Committee on Cervical Pathology and Colposcopy
AGE	Working Group for Gynecological Endoscopy
AGII	Working Group for Infectious Diseases and Infection Immunology
AGO	Working Group Gynecologic Oncology
AGUB	Working Group for Urogynecology and Reconstructive Pelvic Surgery
AIS	adenocarcinoma in situ
ARGUS	Working Group for Ultrasound Diagnosis in Gynecology and Obstetrics
AWMF	Association of the Scientific Medical Societies in Germany
BVF	Federal Association of Gynecologists
BLFG	Association of Head Physicians of Gynecological and Obstetric Hospitals
CIN	cervical intraepithelial neoplasia
DGPFG	German Society for Psychosomatic Gynecology and Obstetrics
DGGG	German Society of Gynecology and Obstetrics
DGP	German Society of Pathology
ETC	European Training Centre for Gynecologic Endoscopy
GnRH	gonadotropin releasing hormone
GR	Grade of recommendation
HE	hysterectomy
HPV	human papilloma virus
IUS	intrauterine system
LASH	laparoscopically assisted supracervical hysterectomy
LAVH	laparoscopically assisted vaginal hysterectomy
LoE	Level of evidence
OEGGG	Austrian Society of Gynecology and Obstetrics
SGGG	Swiss Society of Gynecology and Obstetrics
TLH	total laparoscopic hysterectomy

## II Using this Guideline

### Purpose and objectives

This guideline concerns hysterectomy performed in patients with benign diseases. It aims to examine the entire range of surgical procedures as well as the associated context in order to permit optimal treatment of women in each case. The guideline presents and evaluates the individual indication areas, describes the hysterectomy routes, evaluates the advantages and disadvantages of individual surgical techniques and presents possible alternatives. The guideline aims to provide a basis that women can use to obtain in-depth information in order to make a decision about the treatment plan in consultation with their doctor based on their knowledge of the advantages and disadvantages of the specific procedure and of the effects of the operation on their quality of life. In these times of increasing cost pressure in the health care system, it is also essential to include this aspect in the considerations.

### Targeted patients

Patients with an equivocal indication for hysterectomy and patients who have undergone a hysterectomy.

### Target audience

The guideline addresses members of the health care profession involved in performing this surgical procedure. A medical background is required to understand this guideline.

This guideline is aimed at the following groups of people:

- ▶ gynecologists in private practice
- ▶ gynecologists working in a clinical setting
- ▶ nursing professionals
- ▶ the cooperating partners of the medical profession (e.g. health care professionals, payers)
- ▶ the patients concerned and their personal setting (partners, etc.)
- ▶ the general public, in order to provide it with information about sound medical approaches

### Period of validity

The validity of this guideline was confirmed by the chairpersons/heads of the participating medical societies/organizations/associations and by the head of the DGGG and the DGGG Guideline Commission in April 2015, thereby also confirming the entire contents of the guideline. This guideline is valid until April 30, 2020. This period of validity was estimated based on the contents of the guideline. If need be, the guideline can be updated before it has expired; if the guideline is still considered to represent the current state of knowledge, its period of validity can be extended.

## III Guideline

### 1 Methodology

#### 1.1 Principles

The methodology for the compilation of this guideline is prescribed by the classification assigned to the guideline. The AWMF Guidance Manual and Rules for Guideline Development (Version 1.0) sets out the rules for classifying guidelines. Guidelines are differentiated into lowest (S1), moderate (S2) and highest (S3) class. The lowest class of guideline is defined as consisting of a set of recommendations for action compiled by a non-representative group of experts. In 2004 the S2 class was divided into two subclasses: S2e (evidence-based) and S2k (consensus-based). The highest class (S3) combines both approaches.

**This guideline is classified as S3.**

#### 1.2 Literature search

The following literature databases were searched:

- ▶ Cochrane Menstrual Disorders and Subfertility Group specialized register of controlled trials
- ▶ Central
- ▶ MEDLINE
- ▶ Embase
- ▶ Biological Abstracts
- ▶ The National Research Register

The following keywords were used for the search:

- ▶ hysterectomy CRT
- ▶ hysterectomy
- ▶ vaginal
- ▶ abdominal
- ▶ LAVH
- ▶ LASH
- ▶ TLH
- ▶ myoma
- ▶ endometriosis
- ▶ adenomyosis
- ▶ descensus
- ▶ incontinence

- complications
- quality of life

The search encompassed the period from January 1990 to November 2011. In addition, MEDLINE was specifically searched with regard to certain questions.

In order to achieve a transparent and up-to-date evidence base, an updated literature search was performed in MEDLINE (via PubMed) in 2013–2014 on the following topics:

- comparison of hysterectomy routes
- comparison of hysterectomy to uterine artery embolization or myomectomy for symptomatic uterine fibroids
- comparison of hysterectomy and drug therapy for uterine fibroids, dysfunctional menstrual disorders or adenomyosis.

The results of the literature search were included in the current version of the guideline.

### 1.3 Evidence tables

#### 1.3.1 Evidence grading based on the Oxford Centre for Evidence-Based Medicine levels of evidence

To evaluate the evidence (levels 1 to 5), the Oxford Centre for Evidence-Based Medicine classification system was used in its most recent version published in 2009 as Level of Evidence (LoE).

### 1.4 Recommendation grading

Pure evidence grading of a guideline at S2e/S3 level based on the Oxford classification can be translated into a grade of recommendation (GR) for a guideline. This symbolic recommendation level is divided into three gradations with various degrees of linguistic expression (► Table 2).

**Table 2** Grading of recommendations.

Symbols	Description of binding nature	Expression
A	Strong recommendation with highly binding character	must ( <i>soll</i> )/ must not ( <i>soll nicht</i> )
B	Regular recommendation with moderately binding character	should ( <i>sollte</i> )/ should not ( <i>sollte nicht</i> )
0	Open recommendation with limited binding character	may ( <i>kann</i> )/ does not need to ( <i>kann nicht</i> )

The classification of “Recommendations” presented above corresponds to both the evaluation of evidence and the clinical relevance of the studies on which they are based and their scope/factors not listed in the grading of the evidence, such as the selection of patient cohort, intention-to-treat or per-protocol outcome analyses, medical or ethical action toward the patient, country-specific applicability, etc. Conversely, a strong, moderate or weak level of evidence can lead to strong, regular or open recommendations in a related linear fashion. The only level that permits both an upward *and* downward classification is the moderate evidence level, in which a translation into level A or level 0 is possible. In special exceptional cases, converting the highest evidence level into the weakest/an open recommendation or vice versa must be explained in the background text.

- Strong evidence level → Grade A or Grade B recommendation
- Moderate evidence level → Grade A or Grade B or Grade 0 recommendation
- Weak evidence level → Grade B or Grade 0 recommendation

### 1.5 Statements

If statements by specialists are included in this guideline that are not intended as recommendations for action, but rather simply for the purpose of presentation, these are referred to as “**statements**”. For these statements, it is *not* possible to indicate evidence levels.

### 1.6 Consensus strength

As part of a structured consensus agreement process (S2k/S3 level), the eligible participants at the meeting agree on the statements and recommendations that were drawn up. During this process, significant modifications to the wording may occur. Subsequently, the consensus strength is determined based on the number of participants (► Table 3).

**Table 3** Classification of consensus strength.

Symbol	Consensus strength	Agreement in percent
+++	Strong consensus	Agreement of > 95% of the participants
++	Consensus	Agreement of > 75–95% of the participants
+	Majority agreement	Agreement of > 50–75% of the participants
–	No consensus	Agreement of < 50% of the participants

### 1.7 Expert consensus

As the name suggests, “expert consensus” refers to consensus decision specifically for recommendations/statements without a prior systematic literature search (S2k) or based on the missing evidence (S2e/S3). The term “expert consensus (EC)” to be used is synonymous with terms from other guidelines such as “good clinical practice (GCP)” or “clinical consensus point (CCP)”. The recommendation strength is graded similarly to the aforementioned classification without the use of the symbols and is expressed in purely semantic terms (“must”/“must not” or “should”/“should not” or “may”/“does not need to”).

## 2 Introduction

All of the sections below are excerpts from the long version of the guideline and do not claim to be complete. Only the sections of the long version are mentioned that contain consensus- and/or evidence-based statements or recommendations. Sections without these particulars are described briefly at most.

To obtain more information (background texts, additional literature citations) on existing sections or sections not listed here, please download the long version (see Guideline documents).

## 3 Indications and contraindications

### 3.1 Indications

Common indications for performing hysterectomy for benign diseases include the following: uterine fibroids, menstrual disorders, adenomyosis of the uterus, endometriosis, uterine prolapse and precancerous lesions of the endometrium and the cervix. The numbers in Germany were as follows in 2012: uterine fibroids: 60.7%, prolapse: 27.9%, menstrual problems: 25.2%, hyperplasia and atypia of the endometrium or cervix: 2.9, and endometriosis: 15.1% of cases [1].

Due to the comorbidities, a total of nearly 130% is reached. This also reflects clinical reality, in which the histologically ascertainable findings of uterine fibroids, adenomyosis and endometriosis often coincide. The clinical picture of “menstrual problems” as an umbrella term encompasses hypermenorrhea, dysmenorrhea and dyspareunia. For this reason, it is often difficult to list and code a single diagnosis as the indication for hysterectomy. This overlapping also means that experts may disagree about the treatment plan to be used in a particular case. Thus, when indicating surgery for these conditions, personal experience, especially the mastery of a certain surgical technique or with the use of alternatives, plays a significantly greater role than for cancer, for example, for which treatment is based on a single hard diagnosis.

Due to this special situation, it is particularly important to inform the patient about the range of treatment options, about the recommended procedure, the associated risks and to clearly point out the advantages and disadvantages of each surgical technique that can be expected and if the merits of techniques “compete with” each other.

Ultimately, the decision as to whether hysterectomy is indicated, as well as on using alternative methods, must be made by an informed patient along with her attending physician. For this reason, the term “informed consent and shared decision-making” has become established.

### 3.2 Hysterectomy for uterine fibroids

#### Consensus-based recommendation 3.E1

For suspected symptomatic uterine fibroids, the first step is to clarify whether the symptoms are actually caused by uterine fibroids. **(expert consensus)**

**Consensus strength (+++)**

#### Consensus-based recommendation 3.E2

If the symptoms are caused by fibroids, depending on the patient's life circumstances, the treatment decision must be made together with the patient. **(expert consensus)**

**Consensus strength (+++)**

#### Consensus-based recommendation 3.E3

Hysterectomy may be performed in the case of symptomatic uterine fibroids, if fertility is no longer desired, if treatment alternatives have failed and/or as requested by the patient. **(expert consensus)**

**Consensus strength (+++)**

#### Evidence-based statement 3.S1

For preoperatively anemic patients with uterine fibroids, drug therapy with GnRH analogues or Ulipristal may be indicated prior to hysterectomy. **(LoE<sub>Oxford</sub> 2009 1a [GnRH analogues], 1b [Ulipristal])**

**Consensus strength (+++)**

Literature: GnRH analogues [2,3] and Ulipristal [4,5]

### 3.3 Dysfunctional uterine bleeding

#### Consensus-based recommendation 3.E4

For abnormal uterine bleeding, premalignant or malignant lesions must be excluded prior to further treatment. **(expert consensus)**

**Consensus strength (+++)**

#### Evidence-based statement 3.S2

If hormone therapy has failed and fertility is no longer desired, endometrial ablation and hysterectomy is a treatment option.

**(LoE<sub>Oxford</sub> 2009 1a)**

**Consensus strength (+++)**

Literature: [6]

#### Consensus-based recommendation 3.E5

If endometrial ablation has failed, a hysterectomy must be performed. **(expert consensus)**

**Consensus strength (+++)**

### 3.4 Endometriosis/adenomyosis

#### Evidence-based recommendation 3.E6

To confirm the diagnosis of adenomyosis/endometriosis, a detailed history and an ultrasound examination should be performed. **(LoE<sub>Oxford</sub> 2009 1b, GR A)**

**Consensus strength (+++)**

Literature: [7]

#### Consensus-based recommendation 3.E7

For suspected endometriosis, laparoscopy should also be performed. **(expert consensus)**

**Consensus strength (+++)**

Literature: Expert consensus based on S2k Guideline for the Diagnosis and Treatment of Endometriosis [8]

#### Consensus-based recommendation 3.E8

If the primary desire to have a hysterectomy stems from the patient herself, she must receive detailed information about treatment alternatives and their side effects and success rates. **(expert consensus)**

**Consensus strength (+++)**

#### Consensus-based recommendation 3.E9

If hormone therapy has failed and fertility is no longer desired, a hysterectomy should be performed. **(expert consensus)**

**Consensus strength (+++)**

#### Consensus-based statement 3.S3

For deep infiltrating endometriosis, a hysterectomy may be indicated in the overall concept of complete resection. **(expert consensus)**

**Consensus strength (+++)**

Literature: Expert consensus based on S2k Guideline for the Diagnosis and Treatment of Endometriosis [8]

### 3.5 and 3.6 Cytological suspicion of endometrial and glandular precancers

#### Consensus-based recommendation 3.E10

Microscopically confirmed CIN alone, regardless of severity, is not an indication for hysterectomy.

In the case of persistent HPV detection after conization alone, hysterectomy must not be performed.

If there is a cytological or microscopic diagnosis of an adenocarcinoma in situ (AIS) of the cervix, conization with endocervical curettage of the high cervical canal must be performed (not a primary hysterectomy) in order to rule out an invasive adenocarcinoma.



If there is a cytological or microscopic diagnosis of an adenocarcinoma in situ (AIS) of the cervix, a primary hysterectomy must not be performed in order to rule out an invasive adenocarcinoma. Instead, conization with endocervical curettage of the high cervical canal must be performed.

Hysterectomy may be performed after conization in the case of residual recurrent CIN 2/3 or glandular neoplasia located in the low cervical canal. **(expert consensus)**

**Consensus strength (+++)**

Literature: These recommendations were adopted in the expert consensus based on the S2 Guidelines for HPV infection/pre-invasive lesions of the female genitals: Prevention, Diagnosis and Treatment [9].

### 3.7 Atypical endometrial hyperplasia in the histology of the aspiration or of the curettage material

#### Consensus-based recommendation 3.E11

For atypical endometrial hyperplasia in women no longer desiring fertility, hysterectomy must be performed. **(expert consensus)**

**Consensus strength (+++)**

### 3.8 Prolapse

#### Consensus-based statement 3.S4

The uterus may be retained during surgery for uterine prolapse. **(expert consensus)**

**Consensus strength (+++)**

Literature: Expert consensus based on the Guidelines for diagnosing and treating uterine prolapse [10]

#### Consensus-based recommendation 3.E12

If the uterus is retained, the presence of a malignant tumor should be excluded. **(expert consensus)**

**Consensus strength (+++)**

### 3.9 Urinary incontinence and hysterectomy

#### Evidence-based recommendation 3.E13

Hysterectomy for incontinence problems must be separately indicated. (LoE<sub>Oxford</sub> 2009 2–3, GR A)

**Consensus strength (+++)**

Literature: [11]

### 3.10 Infections

#### Consensus-based statement 3.S5

To treat an infectious disease of the internal genitals, hysterectomy may be indicated in certain circumstances. **(expert consensus)**

**Consensus strength (+++)**

### 3.11 Chronic pelvic pain

#### Consensus-based recommendation 3.E14

Laparoscopy should be performed before performing a hysterectomy for chronic pelvic pain. **(expert consensus)**

**Consensus strength (++)**

Literature: Expert consensus based on the Guidelines for diagnosing chronic pelvic pain in women [12]

#### Evidence-based recommendation 3.E15

When indicating hysterectomy for chronic pelvic pain, the decision must be made in cooperation with the patient based on interdisciplinary findings and the patient must be informed about the high failure rate. (LoE<sub>Oxford</sub> 2009 2a–, GR A)

**Consensus strength (++)**

Literature: [13, 14]

### 3.12 Elective hysterectomy

#### Consensus-based recommendation 3.E16

A hysterectomy that is not medically indicated to be undertaken only at the patient's request should not be performed. **(expert consensus)**

**Consensus strength (+++)**

### 3.13 Emergency hysterectomy (nonpuerperal)

#### Consensus-based statement 3.S6

In rare cases, a nonpuerperal emergency hysterectomy is indicated (trauma, coagulation disorder, bleeding, infection). **(expert consensus)**

**Consensus strength (++)**

## 4 Alternatives to hysterectomy

### 4.1 Uterine fibroids

When choosing an alternative to hysterectomy, the effectiveness and safety of the selected treatment method and the risk of fibroid recurrence should be weighed against the (potential) advantages of retaining the uterus (lower morbidity and retained fertility). In the end, rare complications may necessitate the actually unwanted hysterectomy [15].

#### Consensus-based recommendation 4.E17

Patients must be informed about the individual success and failure rates related to the various methods of fibroid treatment. **(expert consensus)**

**Consensus strength (+++)**

### 4.2 Menstrual disorders

A number of reasons are responsible for menstrual disorders. Around 50% of menstrual disorders have organic causes. These cases require causal treatment such as hysteroscopic polyp and fibroid resection (see also Uterine fibroids) or treatment of adenomyosis or endometrial hyperplasia. If organic causes have been ruled out, intermenstrual and dysfunctional bleeding can generally be treated with hormones, primarily progestogens, and in some cases, also estrogens. The primary indications for hysterectomy are refractory hypermenorrhea and menorrhagia. Before resorting to hysterectomy, the patient should receive in-depth information about the wide range of proven alternatives.

#### Evidence-based recommendation 4.E18

Patients must be informed about the individual success and failure rates related to the various methods of menstrual disorder treatment. (LoE<sub>Oxford</sub> 2009 1b [LNG-IUS], 1a [endometrial ablation], GR A)

**Consensus strength (+++)**

Literature: LNG-IUS [16, 17] and endometrial ablation [18]

## 5 Information and consent

Preoperative information and consent includes the following:

- ▶ the indication and objective of the procedure including an assessment of the probability of success
- ▶ presentation of options for treatment/methods, including non-surgical alternatives
- ▶ explanation of the preferred method
- ▶ description of procedure-related risks and typical complications, including their sequelae
- ▶ information about patient behavior before and after the procedure.

### Consensus-based statement 5.S7

The nature, scope, time and form of information and consent are based on the patient's individual situation, the legal provisions and current case rulings. Treatment options, side effects and probability of success must be presented. **(expert consensus)**

**Consensus strength (+++)**

## 6 Perioperative management

Hysterectomy is a procedure that generally involves the same steps regardless of the indication. For this reason, for quality-related (and forensic) reasons, every hospital is advised to develop standards for perioperative management based on the current evidence. Perioperative checklists are recommended to prevent errors and ensure patient safety [19–24].

### 6.1 Preoperative management

#### Consensus-based recommendation 5.E19

For patients with known or suspected organic or systemic disorders, the relevant laboratory parameters (e.g. for patients with bleeding disorders) must be determined. **(expert consensus)**

**Consensus strength (+++)**

### 6.2 Intraoperative management

#### Evidence-based recommendation 6.E20

Prophylactic antibiotics must be administered prior to hysterectomy. **(LoE<sub>Oxford</sub> 2009 1a, GR A)**

**Consensus strength (+++)**

Literature: [25]

### 6.3 Postoperative management

#### Evidence-based recommendation 6.E21

Perioperatively, risk-adapted thromboembolic prophylaxis must be administered. **(LoE<sub>Oxford</sub> 2009 1a, GR A)**

**Consensus strength (+++)**

Literature: [26]

## 7 Surgical techniques

### 7.1 Vaginal hysterectomy

In addition to the general indication for a hysterectomy, the use of a vaginal approach involves the following special aspects:

- ▶ To ensure that the approach is reliable, the uterus must be sufficiently mobile. In general, with the patient under anesthesia, it should be possible to pull the portio to at least the mid-vagina. The vagina must be sufficiently broad and elastic for the surgery to be performed safely. In case of doubt, it may be helpful to perform the pelvic examination under anesthesia by pulling on the portio using bullet forceps.
- ▶ In the case of suspected extrauterine pathology prior to surgery, for instance, in the adnexa, a laparoscopically assisted or abdominal approach should be favored.

- ▶ A vaginal approach is therefore particularly suitable for benign uterine diseases such as uterine prolapse. For nulliparous women and postmenopausal patients with atrophied vaginas and patients with long, narrow vaginas (obese patients) and patients with massively enlarged uteruses, the vaginal approach has its limits.
- ▶ However, the size of the uterus can be overcome by using morcellation or hemisection. As a rule of thumb, again depending on the sufficient breadth of access and the mobility of the organ, vaginal hysterectomy can be performed for a uterine size of around a 12-week pregnancy or a uterine weight of around 250 to 300 g. This corresponds to an average diameter of the uterine body of around 8 to 10 cm [27]. On the other hand, much larger uteruses can also be delivered safely using a vaginal approach [28].
- ▶ If a patient has already had a Cesarean section or undergone other pelvic surgery, vaginal hysterectomy can be much more difficult and the risk of injuring the bladder is increased. In this case, the situation must be taken into consideration when indicating vaginal hysterectomy.
- ▶ In the case of suspected or confirmed uterine or ovarian malignancy, a purely vaginal procedure should not be the primary choice. Selected patients with microinvasive cervical cancer or endometrial cancer are exceptions [29].

### 7.2 Laparoscopically assisted vaginal hysterectomy (LAVH)

Laparoscopically assisted vaginal hysterectomy (LAVH) combines laparoscopic and vaginal surgical techniques. The use of laparoscopy intends to avoid abdominal hysterectomy and enable vaginal hysterectomy. The laparoscopic part of the procedure includes all of the steps that cannot be performed vaginally or that can only be performed with a great deal of difficulty or increased risk (adhesiolysis, excision of endometriotic nodules, adenectomy, detachment of the adnexa from the uterus). During LAVH, dissection in the area of the broad ligament of the uterus and the parametria ends above the uterine artery, which is detached from the vaginal side.

The uterus is extracted through the vagina and if needed, hemiotomy or morcellation is carried out.

No specific contraindications applying only to LAVH are known. If laparoscopy is contraindicated in general, a purely vaginal or abdominal approach must be considered.

### 7.3 Total laparoscopic hysterectomy (TLH)

With total laparoscopic hysterectomy (TLH), all steps of the procedure are performed laparoscopically. In contrast to LAVH, the dissection of the uterine artery is performed laparoscopically, as is the paracervical dissection up to the vagina, the detachment of the uterus from the vagina and the closure of the vagina by means of laparoscopic suturing. There is no switch from an abdominal to a vaginal approach. Due to the dissection, in particular in the area of the cervix, TLH must be learned as a separate surgical procedure, even by surgeons with laparoscopic experience [30]. For this reason, systematic reviews [31] report about elevated rates of complications, especially in the area of the urogenital tract, as well as increased risk of bleeding and relatively long operation times and recommend that this surgical procedure should be considered as a secondary choice. However, at centers with extensive TLH experience these problems have largely been resolved [30, 32]. Therefore, if there is sufficient experience with the technique, its complication rate is similar to that of other lap-

aroscopic surgical procedures. It appears that the operating time is longer than the operating time for vaginal hysterectomy and LAVH [31]. This is confirmed by the metaanalysis conducted by Gendy et al. [33]. However, the metaanalysis also confirmed that with the inclusion of 5 randomized controlled trials (RCTs) there were no differences with respect to complication rates (LoE 2a, level decreased due to high heterogeneity of the study results and signs of publication bias).

Several publications report postoperative dehiscences of the vaginal cuff in contrast to other modes of hysterectomy [34–36]. This is attributed to the high frequency surgical detachment of the uterus from the vagina, whereby the endoscopic suturing technique is also discussed. A randomized study of vaginal stump suturing techniques comparing vaginal and laparoscopic approaches by an experienced surgeon did not yield any differences [37].

#### 7.4 Laparoscopic supracervical hysterectomy (LASH)

LASH constitutes an alternative to abdominal, total vaginal and total laparoscopic hysterectomy. In 2010, supracervical hysterectomy was performed in 13.5% of cases in Germany, most of them using a laparoscopic approach [1]. In the United States, 2% of all hysterectomies are performed supracervically, while in Scandinavia, around 36% of all hysterectomies are performed as supracervical hysterectomies [38].

With LASH, the first steps are performed similar to the procedure for LAVH and TLH and involve exposure of the site and dissection of possible associated pathologies (adhesions, endometriosis, adnexal abnormalities). Laparoscopic dissection ends at the level of the uterovesical fold. The uterus is detached supracervically and after intraabdominal morcellation is removed via the trocar.

LASH is a procedure with a low complication rate [39–41]. Detaching the uterine body from the cervix at the level of the isthmus means that surgery in the area of the parametria and dissection of the bladder is required to only a limited extent, if at all. The complications reported for TLH, such as urinary tract lesions or dissection-related bleeding, are therefore rare for LASH.

#### 7.5 Abdominal hysterectomy

In addition to the general indication for a hysterectomy, the use of the abdominal approach involves the following special aspects:

- ▶ In addition to oncological indications, the size of the uterus and associated disorders such as endometriosis or extensive adhesions resulting from previous surgery are indications for abdominal hysterectomy.
- ▶ An abdominal approach is also indicated depending on the individual situation in patients with a long, narrow vagina, for nulliparous women and patients with comorbidities and in patients for whom a vaginal or laparoscopic approach does not appear to be possible or would be associated with an increased complication risk. In case of doubt, when deciding whether abdominal hysterectomy is indicated, it may be helpful to perform the pelvic examination under anesthesia by pulling on the portio using bullet forceps.

#### 7.6 Robot-assisted hysterectomy

Robot-assisted surgical procedures are used to a limited extent for treating gynecological and obstetrics patients. They are often indicated in patients with cancer. Robot-assisted hysterectomy can be implemented and can be performed quickly by a surgeon with laparoscopic experience [42,43]. Since the expenses and the operating time are far greater than those for conventional laparoscopy, in view of the limited resources, the use of robot-assisted hysterectomy must be decided on a case-by-case basis [44–47]. Systematic overview articles on robot-assisted hysterectomy (Tapper et al. 2014 [48], Liu et al. 2012 [49], Liu et al. 2014 [50]) identified the same 2 RCTs (Paraiso et al. 2013 [51], Sarlos et al. 2010 [46] [LoE 1b]). The interpretation of both RCTs showed differences in operating times. No differences were observed with regard to complications (blood loss, “minor” or “major” complications or postoperative use of pain medication).

With regard to quality of life, Sarlos et al. – without blinding – observed improvements in some aspects of quality of life after 3 weeks and after 6 to 8 weeks, while Paraiso et al. did not observe any differences after 6 months. In both studies, the operating time for robot-assisted hysterectomy was significantly longer than for laparoscopic surgery, with Paraiso observing an average longer time of 70 minutes and Sarlos reporting 20 minutes longer. The length of hospital stay did not differ.

A systematic review of robot-assisted hysterectomy with a single site port [52] found only retrospective series or case studies with a median operating time of 109 minutes. No information on transfusions was reported (LoE 3). No information on complications or follow-up was reported. The procedure must still be considered to be experimental.



## 8 Intraoperative and postoperative complications

(Table 4)

**Table 4** Incidence of intraoperative and postoperative complications.

FINHYST 2011 (complication)			n = 5 279 (%)	AQUA 2012 (complication)		n = 103 232 (%)
Intraoperative blood loss $\geq$ 1 000 ml	AH		5.7	Intraoperative blood loss $\geq$ 1 000 ml	No comparative data	
	LH		3.0			
	VH		1.6			
Bladder injury	AH		0.9	Bladder injury	0.59	
	LH		1.0			
	VH		0.6			
Ureter injury	AH		0.3	Ureter injury	0.09	
	LH		0.3			
	VH		0.04			
Bowel injury	AH		0.2	Bowel injury	0.23	
	LH		0.4			
	VH		0.1			
Postoperative bleeding or hematoma	AH		2.6	Postoperative bleeding or hematoma	0.94	
	LH		2.7			
	VH		2.8			
Ileus	AH		1.0	Ileus	0.09	
	LH		0.3			
	VH		0.1			
Urinary retention	AH		0.5	Urinary retention	No comparable data	
	LH		0.5			
	VH		1.6			
Urinary tract infection	AH		2.2	Urinary tract infection	1.0	
	LH		0.7			
	VH		1.5			
Wound infection	AH		2.4	Wound infection	No comparable data	
	LH		1.5			
	VH		0.9			
Febrile events	AH		2.5	Febrile events	0.28	
	LH		1.4			
	VH		0.9			
Pelvic infection, hematoma or abscess	10		1.00	Pelvic infection, hematoma or abscess	No comparable data	
	54		5.08			
	51		5.40			

FINHYST study: n = 5 279 with 1 255 abdominal, 1 679 laparoscopic and 2 345 vaginal hysterectomies in Finland in 2006 [53]; AQUA 2012: n = 103 232 independent of approach and distinction between endoscopically performed hysterectomies, only exact mention of 16 196 abdominal hysterectomies and 57 398 vaginal hysterectomies.

Abbreviations: AH = abdominal hysterectomy, LH = laparoscopic hysterectomy, VH = vaginal hysterectomy

## 9 Documentation

Every patient chart created for a patient undergoing a hysterectomy must include the indication, the symptoms and the findings of the patient. These comprise the general and specific history, especially previous illnesses and operations, as well as the general and gynecological examination results including imaging results.

Checklists have proven helpful for perioperative documentation. The surgical report lists the date, diagnosis and summary of the treatment plan, along with the names of the physicians involved. The surgical report serves as a description of the surgical procedure and the findings observed during surgery. In the case of an uncomplicated hysterectomy, this description may be brief. A surgical report becomes particularly important, however, if complications occur. It is recommended to clearly describe in the primary report any special anatomic circumstances and other conditions giving rise to complications. At critical points, such as in the case of parametric bleeding, the surgeon should state that he or she checked the ureter by means of inspection, palpation or exposure and acted properly and carefully.

The postoperative course must also be documented. The scope and results of a physical examination should be listed in the form of notes accompanied by the time of day. The same procedure should be used for findings from other hospitals and institutes. The discharge summary is also very important.

## 10 Comparison of methods

In recent years, numerous publications and two systematic reviews have compared methods. The recommendation of the National Institute for Health and Care Excellence (NICE) [54] was first drawn up in 2002 and was adapted in 2004 and 2006. Independent of this recommendation, a Cochrane Review was conducted and published in 2009 [31], LoE 1a. For the most part, the reviews examine the same studies. Nieboer et al. recently evaluated 34 studies with a total of 4495 women. The NICE publication also evaluated a control study with 37 049 women and a control study with 10 100 women.

The advantages of vaginal hysterectomy compared to abdominal hysterectomy involved the significantly shorter recovery time (mean difference [MD] 9.5 days), fewer febrile episodes and unspecific infections (OR 0.42) and shorter hospital stays (MD 1.1

days). When comparing vaginal hysterectomy with laparoscopic hysterectomy (LH), no significant differences were found in this respect. However the operating time was longer for LH (MD 39.3 minutes) and severe bleeding occurred more frequently (OR 2.76). The Cochrane Review concluded that owing to the same or significantly more favorable results across the board, vaginal hysterectomy should be preferred over abdominal hysterectomy whenever possible. If a vaginal hysterectomy is not possible, laparoscopic procedures can be used to avoid the disadvantages of a laparotomy due to the more favorable adverse effect profile [27]. The American College of Obstetricians and Gynecologists came up with the same recommendations [55].

Diverse comparative analyses have come up with identical results for the procedure with the lowest costs, which is vaginal hysterectomy.

In addition to the systematic review by Nieboer et al., after updating the search to include publications up to June 2014, other systematic overview articles were included on the following issues related to the comparison of methods (► **Tables 5 und 6**):

**Table 5** Comparison of hysterectomy methods

<b>Vaginal hysterectomy vs. abdominal hysterectomy</b>	
Quicker return to normal activity	Average difference 9.5 days
Fewer febrile events, fewer febrile episodes and specific infections	OR 0.42; CI 0.21–0.83
Shorter hospital stay	Average difference 1.1 days
<b>LH vs. abdominal hysterectomy</b>	
Return to normal activity	Average difference 13.6 days
Lower blood loss	Average 45 cm <sup>3</sup>
Lower drop in HB	Average difference 0.55 g/dl
Shorter hospital stay	Average difference 2.0 days
Less wound and abdominal infiltrates	OR 0.31; CI 0.12–0.77
More bladder and ureter injuries	OR 2.41; CI 1.21–4.82
Longer operating time	Average 2.3 min
<b>LAVH vs. TLH</b>	
Lower rate of infection	OR 3.77; CI 1.05–13.51
Shorting operating time	Average 25.3 min
<b>VH vs. LH</b>	
Shorter operating time	Average 39.3 min
Less intraoperative bleeding	OR 2.76; CI 1.02–7.42

**Table 6** Comparison of different hysterectomy modalities.

	<b>Operating time</b>	<b>Blood loss</b>	<b>Complications</b>	<b>Admission period</b>	<b>Return to work</b>	<b>Costs</b>
Vaginal hysterectomy	+++	+++	+++	+++	+++	+++
LAVH	++	+++	+++	+++	+++	++
TLH	++	++(+)	++(+)	+++	+++	++
LASH	++	+++	+++	+++	+++	++
Abdominal HE	++	++	++	+	+	++

Number of "+" means increasing advantage of the method.

#### **Evidence-based recommendation 10.E22**

If possible, vaginal hysterectomy must be favored over abdominal hysterectomy. (LoE<sub>Oxford</sub> 2009 **1a**, GR **A**)

**Consensus strength (+++)**

Literature: [42, 56, 57]

#### **Evidence-based recommendation 10.E23**

If vaginal hysterectomy is not possible, the possibility of laparoscopic hysterectomy should be reviewed. (LoE<sub>Oxford</sub> 2009 **1a**, GR **B**)

**Consensus strength (+++)**

Literature: [42, 58]

#### **Evidence-based recommendation 10.E24**

LASH may be performed as an alternative to abdominal hysterectomy and vaginal hysterectomy. (LoE<sub>Oxford</sub> 2009 **1a**, GR **0**)

**Consensus strength (+++)**

Literature: [59]

#### **Consensus-based statement 10.S8**

However, current data do not permit the different laparoscopic techniques to be exactly differentiated. (**expert consensus**)

**Consensus strength (+++)**

#### **Consensus-based recommendation 10.E25**

Abdominal hysterectomy should only be performed if it is specifically indicated. (**expert consensus**)

**Consensus strength (+++)**

#### **Evidence-based statement 10.S9**

In the available randomized studies, no confirmed patient-related benefits were found for the use of robot-assisted technology. (LoE<sub>Oxford</sub> 2009 **1b**)

Literature: [45–47]

### **11 Special situation – What do I do if...?**

#### **11.1 Hysterectomy for adenomyosis/endometriosis**

##### **Consensus-based recommendation 11.E26**

If the patient has the relevant symptoms, there is no desire for fertility and there are clinical signs of adenomyosis, a hysterectomy should be performed. (**expert consensus**)

**Consensus strength (+++)**

##### **Consensus-based statement 11.S10**

For deep infiltrating endometriosis, a hysterectomy may be indicated in the overall concept of complete resection. (**expert consensus**)

**Consensus strength (+++)**

11.2 Hysterectomy and incontinence

If a patient for whom a hysterectomy is indicated is to undergo surgery for stress incontinence at the same time, the hysterectomy may be performed using the most straightforward procedure. The stress incontinence surgery does not impact the method used for hysterectomy.

11.3 Obstetric hysterectomy for postpartum hemorrhage

Consensus-based recommendation 11.E27

For postpartum, life-threatening uterine bleeding and the failure of alternative treatment options, a hysterectomy is indicated as a last resort and in the event of a life-threatening situation. (expert consensus)

Consensus strength (+++)

12 Quality of life

Evidence-based recommendation 12.E28

Patients should be informed that after they have undergone an indicated hysterectomy, they can generally expect to experience improvement in quality of life and sexual functioning compared to their preoperative situation. (LoE<sub>Oxford</sub> 2009 1a, GR B)

Literature: [60–63]

Evidence-based statement 12.S11

A prophylactic bilateral adnexectomy may be associated with undesired long-term adverse effects and requires separate information and consent. (LoE<sub>Oxford</sub> 2009 1a)

Consensus strength (++)

Literature: [64,65]

13 Algorithm: Alternatives to hysterectomy

(Figs. 1 to 3)

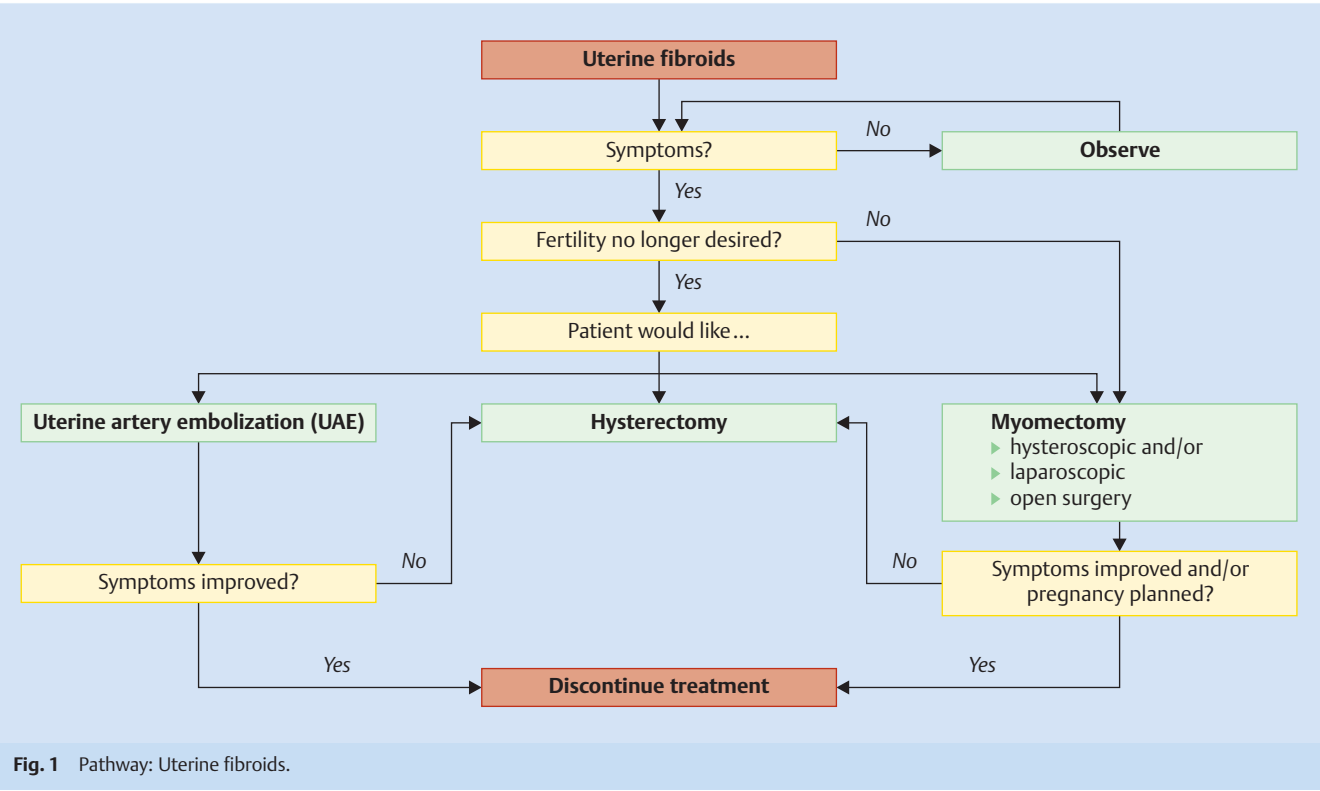
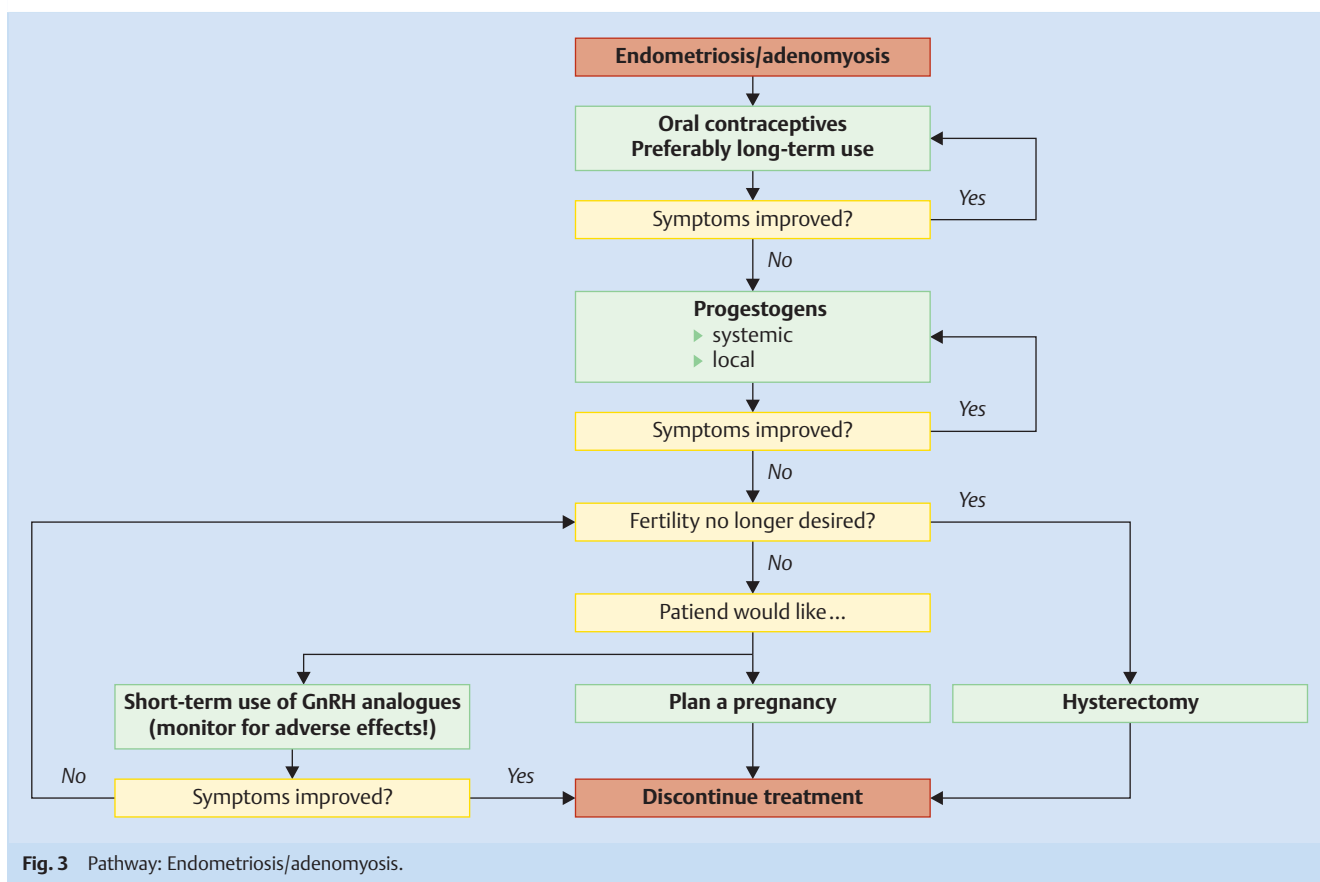
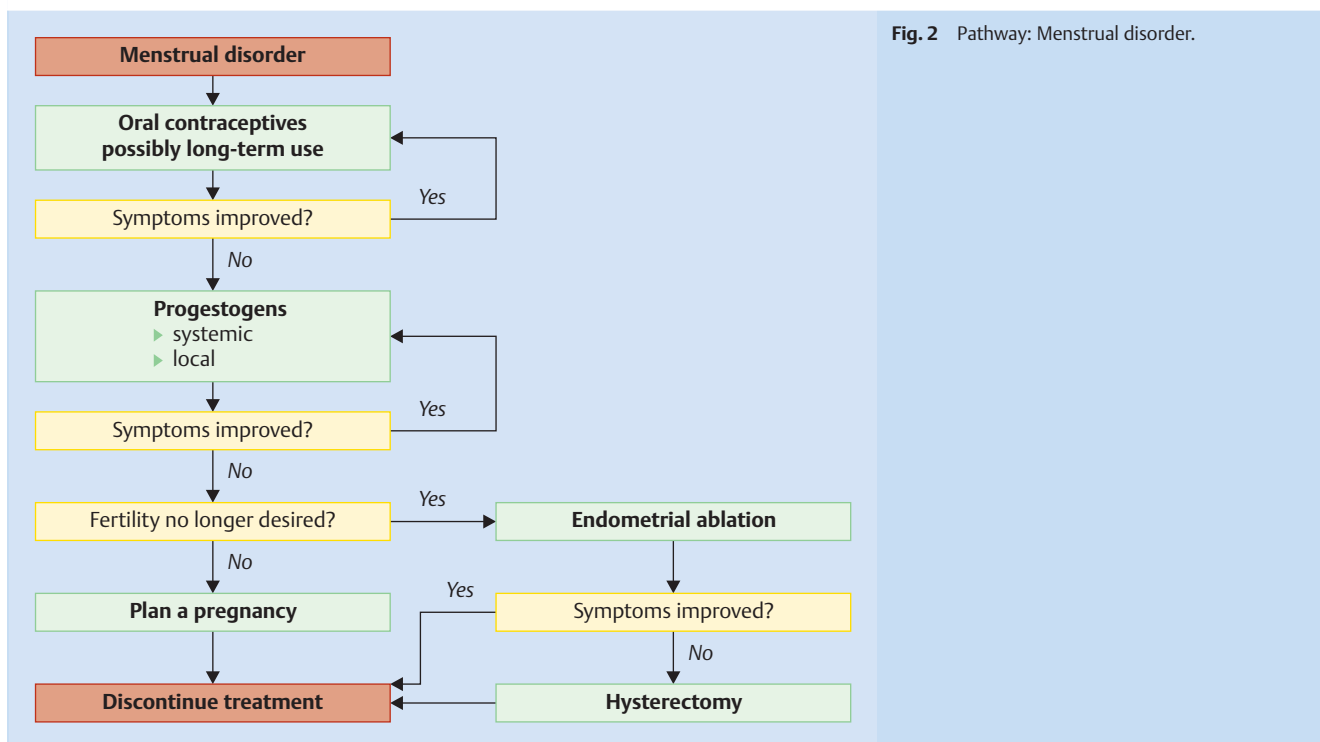


Fig. 1 Pathway: Uterine fibroids.



## Affiliations

- <sup>1</sup> Klinik für Frauenheilkunde, Geburtshilfe und Reproduktionsmedizin der Universitätsklinik des Saarlandes
- <sup>2</sup> Frauenklinik des Universitätsklinikum Tübingen
- <sup>3</sup> Evangelisches Krankenhaus Köln-Weyertal
- <sup>4</sup> Klinik für Neurochirurgie der Universitätsklinik des Saarlandes
- <sup>5</sup> Klinik für Gynäkologie und Geburtshilfe Universitätsklinikum Schleswig-Holstein
- <sup>6</sup> Klinik für Gynäkologie und Geburtshilfe Krankenhaus Agatharied GmbH
- <sup>7</sup> Klinik für Frauenheilkunde und Geburtshilfe St. Elisabeth Krankenhaus Damme
- <sup>8</sup> Klinik für MIC Minimal Invasive Chirurgie am Ev. Krankenhaus Hubertus in Berlin
- <sup>9</sup> Frauenklinik des Universitätsklinikum Tübingen
- <sup>10</sup> Klinik für Gynäkologie und Geburtshilfe St. Josefs-Hospital Wiesbaden
- <sup>11</sup> Privates Brustzentrum Rheinfelden
- <sup>12</sup> Universitätsklinikum Jena Klinik für Frauenheilkunde und Geburtshilfe
- <sup>13</sup> Universitätsklinikum Mannheim Klinik für Frauenheilkunde und Geburtshilfe
- <sup>14</sup> Klinik für Gynäkologie und Geburtshilfe Christian-Albrechts-Universität zu Kiel
- <sup>15</sup> Dysplasiezentrum Reutlingen
- <sup>16</sup> Klinik und Poliklinik für Frauenheilkunde und Geburtshilfe Klinikum der Universität München
- <sup>17</sup> Campus Virchow-Klinikum Charité Klinik für Gynäkologie
- <sup>18</sup> Institut für Pathologie Universitätsklinikum Leipzig
- <sup>19</sup> Institut für Pathologie Mannheim
- <sup>20</sup> Universitätsklinikum Erlangen Frauenklinik
- <sup>21</sup> Frauenklinik Aschaffenburg
- <sup>22</sup> Frauenärzte-West Saarbrücken
- <sup>23</sup> Krankenhaus der Barmherzigen Schwestern Linz
- <sup>24</sup> Inselspital Bern
- <sup>25</sup> Kantonsspital Frauenfeld
- <sup>26</sup> Universitäts-Frauenklinik Graz

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### Editors

#### Leading Professional Medical Associations



**German Society of Gynecology and Obstetrics  
(Deutsche Gesellschaft für Gynäkologie  
und Geburtshilfe e. V. [DGGG])**  
Head Office of DGGG and Professional Societies  
Hausvogteiplatz 12  
DE-10117 Berlin  
info@dggg.de  
<http://www.dggg.de/>

#### President of DGGG

Prof. Dr. med. Diethelm Wallwiener  
Universitätsfrauenklinik Tübingen  
Calwerstraße 7  
DE-72076 Tübingen

#### DGGG Guidelines Representative

Prof. Dr. med. Matthias W. Beckmann  
Universitätsklinikum Erlangen  
Frauenklinik  
Universitätsstraße 21–23  
DE-91054 Erlangen

#### Guidelines Coordination

Dr. med. Paul Gaß, Tobias Brodkorb, Marion Gebhardt  
Universitätsklinikum Erlangen  
Frauenklinik  
Universitätsstraße 21–23  
DE-91054 Erlangen  
fk-dggg-leitlinien@uk-erlangen.de  
<http://www.dggg.de/leitlinienstellungennahmen>



**Austrian Society of Gynecology and Obstetrics  
(Österreichische Gesellschaft für Gynäkologie  
und Geburtshilfe [OEGGG])**  
Innrain 66A  
AT-6020 Innsbruck  
stephanie.leutgeb@oeggg.at  
<http://www.oeggg.at>

#### President of OEGGG

Prof. Dr. med. Uwe Lang  
Universitätsklinik für Frauenheilkunde  
und Geburtshilfe Graz  
Auenbruggerplatz 14  
AT-8036 Graz

#### OEGGG Guidelines Representative

Prof. Dr. med. Karl Tamussino  
Universitätsklinik für Frauenheilkunde  
und Geburtshilfe Graz  
Auenbruggerplatz 14  
AT-8036 Graz



**Swiss Society of Gynecology and Obstetrics  
(Schweizerische Gesellschaft für Gynäkologie  
und Geburtshilfe [SGGG])**  
Gynécologie Suisse SGGG  
Altenbergstraße 29  
Postfach 6  
CH-3000 Bern 8  
sekretariat@sggg.ch  
<http://www.sggg.ch/>

#### President of SGGG

Dr. med. David Ehm  
FMH für Geburtshilfe und Gynäkologie  
Nägeligasse 13  
CH-3011 Bern

#### SGGG Guidelines Representative

Prof. Dr. med. Daniel Surbek  
Universitätsklinik für Frauenheilkunde  
Geburtshilfe und fetomaternal Medizin  
Inselspital Bern  
Effingerstraße 102  
CH-3010 Bern